BLOOD EXAMINATIONS IN THEIR RELATION TO SURGICAL PROCEDURES.[1]

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THE deductions which can be made in the comparatively new science of hæmatology are not yet many nor positive, in fact are often only inferences. It is our duty, however, to live up to the light we have, since far more mistakes in medicine are made from omitting to do so, than for lack of means of arriving at a correct solution of the problem. In especially three particulars much aid to the surgeon may be had by blood examination, viz., 1. Hæmoglobin content; 2. Leucocyte decrease; 3. Leucocyte increase—polymorphonuclear, mononuclear; and to these three let me call special attention.

Hæmoglobin percentage reduction occurs in various diseases, neoplasms, and conditions for which surgical interference is often the only remedy. In the last few years it has been clinically demonstrated that there is a limit beyond which it is almost always fatal to go, and as more and more evidence accumulates, this low limit is found to lie between 40 and 50 per cent. Below this the fatality of the immediate interference rises most emphatically, so that some good authorities refuse interference when below 30 per cent., unless instantly imperative. I have learned in this regard, however, that we must differentiate between a temporary sudden hæmoglobinæmia and those forms of gradual diminution such as intestinal or stomach ulcers, hæmorrhoids, uterine fibroids, or bleeding carcinomata may bring on. Take, for example, those induced by an extra-uterine hæmorrhage. Here the hæmoglobin content may sink to 18 or 20 per cent., and yet prompt, quick interference be well borne by the patient, since the blood-making capacity has not been impaired, overworked, or destroyed by preceding disease or losses; only a brief tiding over with transfusion, infusions, and stimulating enemata being necessary, while these identical efforts fail to restore those of the former class. There seems to be ground for the belief that the general anæsthetic is an important detrimental factor in the increased mortality, and the deduction is made that, where feasible, local anæsthesia (of Schleich) should be used. To those of us who see for the first time gall-bladders, herniæ, intestines, and bladder-stone operated on with the patient lying awake conversing with one, it will be a revelation as to the extent of interference thus made feasible.

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Leucopœnia.—Leucocytes decrease (from the normal 6500) with certain diseases, the number of which is quite limited (*e.g.*, malaria, tuberculosis, measles), and among which typhoid is the most often observed, we have a reduction far below the normal, of the white blood-corpuscles. Here, not infrequently, the blood examination will solve a difficult surgical problem. For example, I relate the following case:

A young man in previous fair health, but somewhat run down, is seized suddenly with a classical appendicitis of excessive violence, very high temperature (105° F.), is operated within fourteen hours from inception of attack. A badly gangrenous appendix removed not yet perforated. Temperature drops to normal and remains so nine days. Then a gradual rise during a week with all the ear-marks of a commencing typhoid; the proper curve, iliac tenderness, headache, Widal partial, etc. Repeated physical examinations by several able consultants failed to find any point at which it seemed probable suppuration could be, but the blood count revealed a leucocytosis of 19,000, with a predominance of multinuclear neutrophile corpuscles. This made it positive that it was not a typhoid, and, in desperation at inability to locate the focus, we explored the right lobe of liver, finding a centrally located abscess. Here without the blood count one could have been content to treat the case as one of typhoid. Again, the converse of this case may save (if blood examination be made) some of the future typhoids from operation for suspected appendicitis when the tenderness is only that of the typhoid ileum! Such cases are recorded.

Certain drugs or starvation diet may reduce greatly the leucocyte count; hence, the blood findings are only to be considered as a single factor in the sum total which go to the making of a final diagnosis, and should never outweigh definite positive clinical knowledge. I recently removed an appendix from a patient whose blood count on three occasions was 4200, 4400, 4500, because all the classical symptoms were there, and only later discovered that the patient had been taking for a week enormous doses of a headache remedy with absolute starvation diet, water only.

Leucocytosis.—Again, the surgeon may gain valuable aid and information through those increases in the number of the white bodies of the blood now so often observed, provided a correct interpretation be made of their significance. Because we have not yet arrived at that ideal state, but make occasionally improper deductions, is no reason why we should deride or ignore those facts discovered by the painstaking work of others. The evidence is enormous and constantly accumulating which demonstrates the relationship between infectious inflammatory processes and the increase in the multinuclear neutrophile leucocytes. In like manner the number of mononuclear leucocytes in uncomplicated neoplasms is often observed. (Hartman.)

And while Donati's careful studies of the blood of thirty-seven cases of neoplasms show that there is no specific type of blood for neoplasms, they also show that the differential count shows changes in the number, form, and peculiarities of the cellular elements both red and white, that much information can be gained in uncomplicated cases. Growths breaking down in situations where at the same time they disturb the digestive processes, of course so complicate matters as to render the blood examinations only a secondary aid.

This brings us to the fact that there are two principal forms of white corpuscles, and that the number alone must not be depended on in doubtful cases, but the form and other peculiarities must be noted if all the knowledge to be gleaned is to be utilized (Malassez). The multinuclear leucocyte is notoriously the one to wander out in the neighborhood of an infected area and, dead or dying, to constitute the pus formed. What wonder, then, that with increased demand there comes an increased production; the difficulty as yet being to differentiate between the physiological waves of increase and those produced by other factors than infection. Cabot's investigations make a 33 per cent. increase quite within the normal for such changes as digestion, exercise, and other physiological processes may induce. Indeed, the number of causes which may lead to a mild leucocyte increase are so numerous that only when associated with positive clinical evidences of disease should such increase have any influence in the ultimate decision.

Again, the absence of such increase should not outweigh clinical evidence sufficient to make a diagnosis, but may with justice influence prognosis and treatment.

In abdominal inflammations in particular can it be said that study of the changes in the blood has proven of most aid. For the year 1901, Woehnert calls attention to the fact that in those cases of appendicitis in which the white blood count ran above 20,000 pus was found. It is stated that in the non-suppurative variety of appendicitis over 20,000 count is not seen. It has been said that with this variety of infection more than any other intra-abdominal lesion is the leucocyte count highest and neutrophilic (Brown), perhaps because of the mixed type. When within twenty-four hours 18,000 are exceeded, one can usually be sure of a severe type of infection, and, with stationary or increasing severity of the clinical symptoms, operation will be justified. Again, with mild clinical symptoms but steady and rapid rise in the count the hint is furnished of progressing disease. In the later stages, a marked drop in a very high leucocyte count, without a corresponding improvement in the clinical symptoms, may be interpreted as increased severity in the condition, for, finally, the very toxins which in smaller amount call for the increase may in larger amount overwhelm the system producing leucocytes.

In intestinal obstruction, Cushing has emphasized the relationship of the leucocyte to the condition obtaining in the obstructed part. When in the first twelve hours without clinical symptoms being marked, if there be a rapid rise to 20,000 there is serious interference with the integrity of the incarcerated gut likely to terminate in (perhaps) gangrene. Schnitzler, too, emphasized this aid to decision as to operation; but there must be no way of schematizing, however, as all the clinical factors must be given their just weight.

In my limited experience, those causes inducing leucocytosis in the child do so to a higher degree and more quickly than in the adult. In conclusion, I would say with Biernacki, "It is as great a surgical sin to omit the examination of the blood in appropriate cases as failure in cases of general œdema to examine the urine." Hæmodiagnosis must in the future be a part, never the whole, of every carefully studied case, and if at times we are unable to interpret correctly these changes, we will be at others well rewarded for having not neglected this instrument of precision at our command, the blood counter of Zeiss or Breuer.